Pre-ACE Polarimeter
~ *Final Presentation* ~
IDL Systems Engineering

September 9, 2011
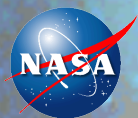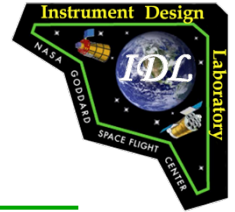
2011 PACE Polarimeter

- CLASS B Mission
  - Selective redundancy
  - Class S electronics parts at customer direction

- Launch 2019

- Polar, (sun-synch, 1330 ascending node) orbit @ 650 km, ~98° inclination

- 3 yr. mission lifetime, 5 yr. goal

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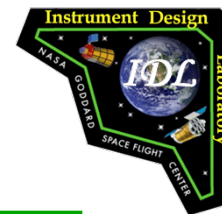
Total Instrument Rack-up
(no contingency included)

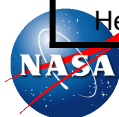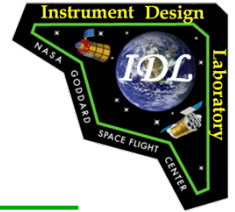| PACE Polarimeter	Total Mass	Total Power (Effective Average)	Total Data Rate

UV Channel
VNIR Channel
SWIR Channel
  Telescope
  Photodiode Ring
  Calibration Wheel Mechanism
  Detector + ROIC
  Detector Assembly Enclosure
  ASIC
 	
Aperture Wheel / Mechanism
Polarization / Calibration Hemisphere
Calibration Lamp
 	
Optical Bench
Polarimeter Enclosure
Instrument Base Plate
 	
Main Electronics Box
Mechanism Control Electronics Box
Alignment Mechanism Control Electronics Box
 	
Thermal Subsytem
  Deployable Earth Shade
  Radiator
  Heat Pipes
  Heaters
	167.4 Kg	**121.2 W**
		Orbital Average Power
		
		Peak Power 243
			Average Data Rate to S/C SSR = 66.7 Mbps
			(33.4 Mbps with 2:1 loss-less compression)

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Top-Level* Mass Summary by Subsystem
(no contingency included)

PACE Polarimeter	Mass CBE (Kg)	% of Total Mass
Optical	5.4	3.2%
Detector	1.7	1.0%
Electrical	17.3	10.3%
Mechanism	27.2	16.3%
Mechanical	57.8	34.5%
Thermal	23.3	13.9%
Harness	26.7	16.0%
5% misc Hardware	8.0	4.8%
Total (+5% hardware and no margin):	167.4	100.0%

*this listing does not include all subassemblies, please refer to the final mass model (MEL) for a full summary

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Data Rates

Readout Data Rates

Given: Ground Track Velocity ~ 7Km/sec (for ~ 650Km orbit)

⇒Frame rate = 7 Frames/sec (ie. 7Hz)

⇒**Instrument Total Data Rate ~ (16.7 + 38.9 + 11.1)Mbps ~ 66.7Mbps** ,

or **~ 33.4Mbps** (assuming 2:1 loss-less data compression)

Data Storage

Assume 12hours/day requirement (ie. Collect data for 50% of each orbit)

Data Storage Rate: ~ (33.4Mbps x 60sec/min x 60min/hour x 12hours) ~ **1.5Tbits**

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